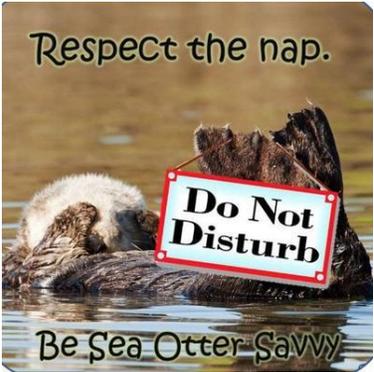


California Sea Otter Fund Summary of Projects Funded

The California Sea Otter Fund was established in 2006 as an income tax check-off program allowing taxpayers to dedicate funds to facilitate sea otter recovery (Revenue and Taxation Code (RTC) Section 18754). The funds may be used for “research, science, protection projects or programs related to the Federal Sea Otter Recovery Plan or improving the nearshore ocean ecosystem, including, but not limited to, program activities to reduce sea otter mortality.” (RTC Section 18754.2(a)(3)). Each year, half of the available funds are appropriated to the Coastal Conservancy to undertake projects the advance the goals of the fund. From 2008-2015, the Conservancy has awarded a total of \$1,033,582 in grants and contracts from the California Sea Otter Fund, as summarized below.

RECOVERY ACTIONS IMPLEMENTED

- **Be Otter Savvy Program** (2016-ongoing; \$62,000). The goal of the “Be Sea Otter Savvy” program is to reduce sea otter disturbance by inspiring responsible viewing of wild sea otters. Southern sea otters are coming increasingly into contact with humans, especially in harbors and estuaries, where the charismatic species is a primary attraction for ecotourists. Recent research suggests that the stress of repeated disturbance may lead to pup abandonment or even death. The Be Otter Savvy Program engages and educates the wildlife-viewing public, either directly or indirectly through operators of marine recreation and ecotourism businesses.
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- **Pinto Lake Carp Removal** (2014-2015, \$11,700). Pinto Lake in the City of Watsonville was known to experience massive cyanobacteria blooms which produce dozens of very potent hepatotoxins and neurotoxins, including microcystin. Researchers at U.C. Davis discovered that the deaths of at least 31 southern sea otters in the Monterey Bay region are attributed to these cyanotoxins, with Pinto Lake being identified as a likely source. The primary cause of these toxic algal blooms is the presence of elevated nutrients in the lake with the level of phosphorus being the limiting factor. A significant portion of the phosphorus in the lake is mobilized from the lakebed sediment by the feeding practices of carp, a non-native species. Because of this, the City undertook a project to remove carp from Pinto Lake in order to reduce production of the lethal toxins.
 - **Sea Otter Awareness Outreach and Education** (2013-2015; \$58,640). Friends of the Sea Otter, in coordination with the Sea Otter Alliance worked to inform the public, including policy makers and regulators, about the status of sea otters, their habitat, and additional research needed to adequately manage problems plaguing the population. Development and implementation of a public education and outreach campaign was identified as Recovery Objective #7 in the 2003 Recovery Plan for the Southern Sea Otter. The public education focused in particular on Sea Otter Awareness Week, and also included outreach activities to educate the public on what constitutes harassment of sea otters, the harm to sea otters that may result, and how to avoid harassment while still enjoying observing sea otters.

RESEARCH RELATED TO SEA OTTER RECOVERY

- **Investigating Sea Otter Use of Elkhorn Slough to Inform Restoration** (2013-ongoing; \$121,562).

Over the past decade, sea otter use of Elkhorn Slough has increased dramatically. In particular, a high density of female otters and pups have been observed in the slough. Since 2013 researchers at U.C. Santa Cruz and the Elkhorn Slough National Estuarine Research Reserve have been investigating otter feeding habits and behavior, and prey availability. This information will be summarized and used to develop guidelines for future management and restoration of the slough to support continued recovery of the otters. In addition, the information will be helpful in planning for colonization of other estuaries given that range expansion is critical for otter recovery (see Sea Otter Population Study, below).



- **Investigating Sea Otter Mortality Patterns (1998-2012)** (2013-2017; \$165,543).

Researchers at U.C. Davis updated and expanded a landmark epidemiological study conducted in 2003 about impacts of coastal contamination on sea otters. The new effort undertook extensive systematic diagnostic testing and comprehensive epidemiological analyses on 560 deceased otters from fifteen years of samples to provide a broader understanding of sea otter mortality. Primary causes of death include shark bite, *Ancanthocephalan peritonitis* parasitic worms, domoic acid, and cardiomyopathy. This study was able to pinpoint disease “hot spots”, risk factors for disease expression, and interactions between key causes of death. Early findings from this study identified microcystin, a freshwater toxic algae, as a cause of otter deaths and linked them to drainage from Pinto Lake in Watsonville (see Pinto Lake Carp Removal project, above).

- **Risk Factors for Shark Bite Mortality in Southern Sea Otters** (2012-2014; \$59,447).

From 2009 through 2013, researchers observed a 30-40% increase in sea otter mortality as a result of shark bites. This is unprecedented in over 35 years of data collection. In some parts of California, particularly in southern portions of the sea otter range shark bite mortality had become the single biggest driver of population trends. Researchers at U.C. Davis investigated whether environmental, spatio-temporal, and/or health-related risk factors were associated with these attacks in order to help management agencies take appropriate action. The study did not find any correlation between shark bite mortality and underlying infections; however, it did reveal a distinct temporal and spatial trend for shark bites lethal to otters consistent with periods of the year when great white sharks are closer to the coast.

- **Sea Otter Population Biology at Big Sur & Monterey CA: Investigating Consequences of Resource Abundance and Anthropogenic Stressors for Sea Otter Recovery** (2008-2013, \$498,690). This multiyear study, led by researchers at U.C. Santa Cruz, examined the effects of contaminants and human-caused stressors on southern sea otter populations. The study tested several hypotheses related to the idea that population success would be lower for otters living in areas with more exposure to anthropogenic stressors, including water quality toxins and pollutants, resulting in shortened lifespans. Surprisingly, this study found that overall food availability was the most significant limiting factor on sea otter populations leading to lower rates of successful reproduction. Conclusions of the study included that in order to increase the population of southern sea otters to achieve recovery, their range and thus food availability will need to expand. Exposure to contaminants do effect survival, but the interaction is complex and needs to be addressed at a site specific, not regional, level.